The Excavating Engineer

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The World's Highest Earth Dam

Description of construction of the Tieton Dam by the United States Reclamation Service in the Yakima Valley, Washington. Height 321 feet, involving 1,850,000 cubic yards of earth and rock fill.

THE building of the Tieton Dam is a $5,000,000 undertaking now in progress by the Reclamation Service to store water for irrigation purposes in the Yakima Valley of the State of Washington.

The dam is an earth and rock fill type with concrete core extending from bedrock to crest, with a hydraulic clay and silt puddle on the upstream side of the corewall.

The principal outstanding quantities and dimensions follow:

Height

Foundation to Crest	321 feet
River Bed to Crest	233 feet
Maximum Earth Embankment	244 feet

Top Width 25 feet

Length

Along Crest	905 feet
Toe to Toe	1110 feet

Embankment

Earth Fill	1,600,000 cubic yards
Rock Fill	250,000 cubic yards

Concrete

Corewall	24,000 cubic yards
Spillway	16,000 cubic yards
Outlet Works	3,500 cubic yards

Diversion Tunnel

Length	2120 feet
Height	19¼ feet
Width	22 feet
Discharge during Construction	10,000 second feet
Discharge for Irrigation	2000 second feet

Spillway

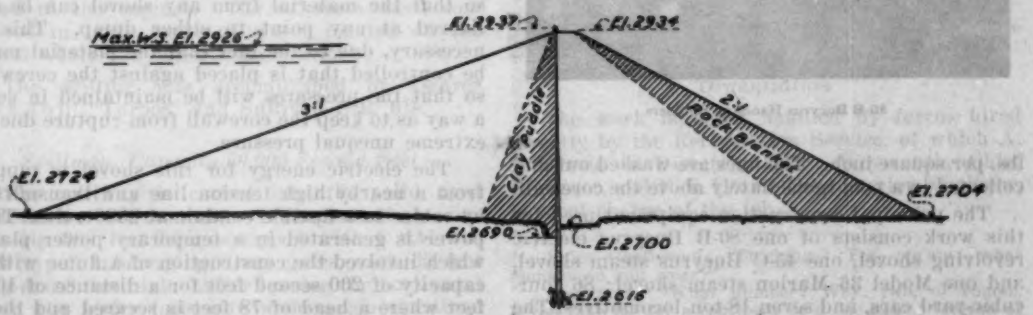
Crest Length	390 feet
Number of Gates, 8 feet x 65 feet	6
Discharge Capacity	50,000 second feet

Reservoir

Drainage Area	187 square miles
Submerged Area	2500 acres
Capacity	202,500 acre feet

The Corewall (321 feet high)

The most difficult construction feature was the excavation for the corewall, approximately 100 feet deep and 5 feet wide, across the Tieton River channel in wet ground. To accomplish this, shafts were sunk on center line at intervals of about 150 feet into bedrock a depth of from 5 feet to 26 feet depending on the quality of the rock. Drifts 5 feet x 6 feet were then driven on line at the bottom of the shafts. After the completion of the first or lower drift, a second drift (5 feet x 6 feet) was excavated by stoping into cars running on track in lower drift. Upon the completion of



Section of Tieton Dam Showing Extreme Elevations

the second drift, the first was filled with concrete, after which a third was stoped out, and the second filled with concrete. Following this general scheme, the concrete wall was brought to the surface.

Embankment (Maximum Earth Fill 244 Feet—1,850,000 Cubic Yards)

The embankment is of earth and rock fill construction, heavily blanketed on the down stream side by straight rock fill excavated from the spillway cut. The earth and rock is excavated from the adjacent mountain sides with electric and steam shovels, and conveyed to the dam site over 36-inch gauge track and four-yard Western cars, where it is dumped from trestles located on the outer slopes of the dam. It is then thoroughly washed by giants working under a pressure of 100

80-B Bucyrus Handling Boulders

lbs. per square inch. The fines are washed out and collected in a pool immediately above the corewall.

The principal construction equipment used for this work consists of one 80-B Bucyrus electric revolving shovel, one 45-C Bucyrus steam shovel, and one Model 36 Marion steam shovel; 86 four-cubic-yard cars, and seven 18-ton locomotives. The sluicing water is provided by three 200 H. P. directly connected centrifugal pumps, manufactured by the Worthington Pump Co. During the season 1922 approximately 1,000,000 cubic yards were placed in the dam.

The methods of earth and rock moving for the embankment are clearly shown in our panoramic view on the center page spread of this issue. The fills under construction are clearly indicated. The corewall may be seen in the center of the view with the giants at work.

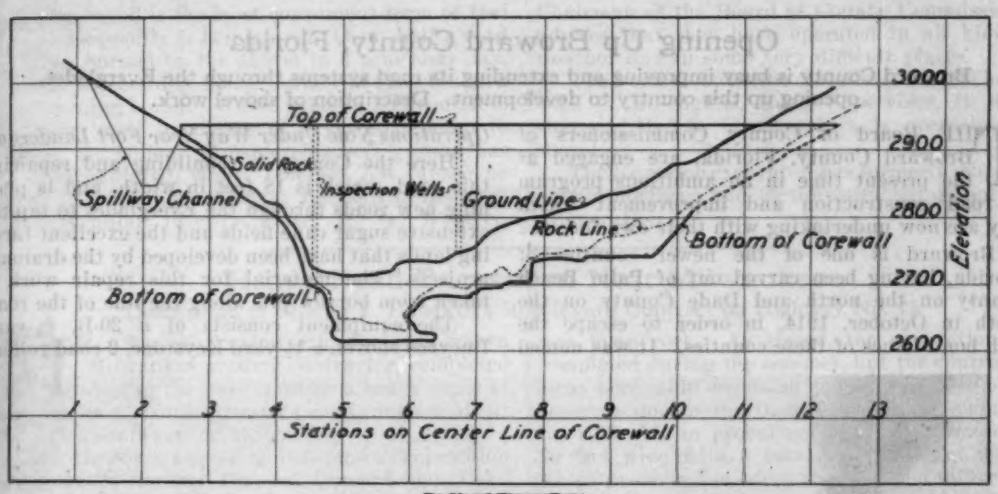
Both the upstream and downstream fills are approached by tracks from both sides of the canyon

Left to Right — F. T. Crowe, Construction Engineer, A. L. Davis, Director United States Reclamation Service, Albert B. Fall, Secretary of the Interior

over which material is hauled and dumped. To the left of this view may be seen the Bucyrus 80-B electric shovel in operation. This shovel is equipped with a 32-foot boom and a 20-foot dipper handle with a 2½-cubic-yard dipper. It loads four-yard Western cars which are hauled to the fill by Vulcan locomotives. This shovel has been loading an average of 5000 yards per day, its maximum output being 465 four-yard cars in eight hours. The output for December was 28,386 cubic yards, 541,850 cubic yards having been handled by this machine during 1922.

The cost of loading cars on the embankment proper for the season was 9.7c per cubic yard. All tracks from the borrowpits are inter-connected, so that the material from any shovel can be delivered at any point to either dump. This is necessary, due to the fact that the material must be controlled that is placed against the corewall so that the pressures will be maintained in such a way as to keep the corewall from rupture due to extreme unequal pressure.

The electric energy for this shovel is tapped from a nearby high tension line and transmitted by cables in a flexible conduit at 2300 volts. This power is generated in a temporary power plant, which involved the construction of a flume with a capacity of 200 second feet for a distance of 4000 feet where a head of 78 feet is secured and there generates 1400 horsepower at 2300 volts. A



Profile of Tieton Dam

transformer in the rear of the house of the shovel steps this down to 440 volts for the motors. The main machinery is operated by a 150 H. P. motor and the thrust and swing by 50 H. P. motors.

A Marion Model 36 steam shovel with a one-yard dipper is also used on the embankment.

Diversion Tunnel

The diversion tunnel is 2200 feet long with 19 feet x 22 feet section through the andesite rock wall of the Tieton Canyon. It serves the dual purpose of carrying the Tieton River during construction of the dam, and housing the outlet control works which will be installed upon the completion of the other construction features.

It was excavated by the top heading and bench method. The muck was handled by a "home-brewed" electric shovel mucker and a Bucyrus 45C equipped with a 16-foot boom and short "A" frame and 1-cubic-yard dipper. The shovel was operated by steam produced at the portal and piped to the engines. The exhausts were condensed in large tanks of water located on the shovel where the boiler usually stands.

The drilling was accomplished by Denver Rock Drill "Turbos" and Sullivan D.R. 61s.

Spillway (Capacity 50,000 Second Feet)

The spillway is carved into the solid west abutment of the dam site. It consists of an overflow lip 390 feet long equipped with 6 "Arrow-rock type" submerging drum gates, each 65 feet long and 8 feet high. After leaving the horizontal crest, the water falls into a deep concrete-lined channel excavated through the side of the mountain, which carries the water into the river bed well below the toe of the dam. To accomplish this will require the excavation of 165,000 cubic yards of rock and the placing of 16,000 cubic yards of concrete. The excavation is now being accomplished with an 80-B Bucyrus electric shovel and a 45-C Bucyrus steam shovel.

The spillway will develop a capacity of 50,000 second feet before the dam would be overcapped. The water in the lower section of the channel will have a velocity of 100 feet per second.

Outlet Control

The discharge from the reservoir will be controlled by two 60-inch balance valves located at the outlet of the diversion tunnel. They will be connected to two 72-inch steel pipes, which will extend into the tunnel about 800 feet, these in turn being connected to two 60-inch square emergency slide gate valves, which will be operated by 24-inch oil cylinders. About the gates the tunnel will be solidly plugged with concrete.

The maximum demand on the gates will be 2500 second feet.

Organization

The work is being handled by forces hired directly by the Reclamation Service, of which A. P. Davis is Director, F. E. Weymouth, Chief Engineer, and F. T. Crowe, Construction Engineer, in local charge of the job.

Sales Gentleman: "Stockings? Yes, ma'am; what number do you wear?"

Constance: "What number? Why, two, of course. D'you take me for a centipede or a one-legged veteran of the war?" —*U. S. Recruiting News.*

Opening Up Broward County, Florida

Broward County is busy improving and extending its road systems through the Everglades, opening up this country to development. Description of shovel work.

THE Board of County Commissioners of Broward County, Florida, are engaged at the present time in an ambitious program of road construction and improvement which they are now undertaking with their own forces.

Broward is one of the newer counties of Florida, having been carved out of Palm Beach County on the north and Dade County on the south in October, 1914, in order to escape the high bond issues of these counties. It was named after Governor Broward, who was the first governor to attempt the drainage of the Everglades, and who started the first dredge on this work near Fort Lauderdale.

As this territory is almost entirely the swamp land of the Everglades, it is obvious that a very large proportion of this territory is practically useless, but modern engineering is slowly but surely reclaiming it to cultivation.

The road-building program is a part of this gradual development and promises much in the opening up of country which hitherto had been impassable. The county has about fifty miles of the Dixie Highway, running from two miles below Hallandale on the south to a mile north of Durfield on the northern boundary.

Operations Now Under Way Near Fort Lauderdale

Here the County is rebuilding and repairing this road, which is 18 feet in width, and is planning new roads through the Everglades to tap the extensive sugar cane fields and the excellent farming lands that have been developed by the drainage projects. The material for this repair work is taken from borrow pits along the line of the road.

The equipment consists of a 20-B, ¾-yard Bucyrus shovel, a ½-yard Keystone, 2 road rollers, one road oiler, a road scraper and 17 trucks, 7 of which were assigned to the County by the War Department, and the balance purchased new.

Bucyrus 20-B ¾-yard Shovel Owned by Broward County, Florida

The general method of procedure is to spread 10 to 15 inches of coral rock as a base upon which the excavated material is placed.

The Bucyrus shovel is at the present time working in one of these borrow pits on the southern end of the work near Fort Lauderdale, carrying a face of about 10 feet and loading trucks. The haul at present is 1½ miles from the pit to the work, consequently with but 17 three-yard trucks to span this gap the shovel is idle easily half the time as a three-yard truck can be loaded by this machine in 34 seconds actual digging time.

As might be expected from the geographical

location, wood is the most convenient form of fuel and consequently is being used. About half a cord is being burned by the shovel in a nine-hour day. This is successfully being burned in the standard coal-burning boiler. Water is being pumped from a nearby well by means of a gasoline pump to supply the boiler. Considerable soft ground has been encountered, which, however, has caused no delay in shovel operation as the 20-B is mounted on caterpillar traction. Mr. H. G. Wheeler, Chairman of the Board of County Commissioners advises that they have operated in all kinds of weather and in some very difficult places.

The work is under the direction of Mr. Wheeler, with C. E. Ingalls, Road Supervisor, in direct charge. Mr. L. C. Chambers is operating the shovel.

The Keystone excavator was formerly employed on the northern end of the work but is not now in operation.

Heavy Road Excavation Near Milwaukee

Description of Charles F. Haworth's 50,000-yard Contract on Highway No. 75

MR. Charles F. Haworth, the well-known Milwaukee grading contractor, completed during the past summer a heavy piece of grading on a six-mile concrete road contract about ten miles southwest of Milwaukee.

Mr. Haworth figured on this job in conjunction with the Milwaukee General Construction Company and was awarded the contract early in May.

Charles Boyer, the Efficient Superintendent in Charge of the Bucyrus Outfit

Work was actually started on May 15th, Mr. Haworth handling the excavation and the Milwaukee General Construction Company the paving. The work was on what is known as the Center Road or Highway No. 75 and runs from the West Allis city limits at Lincoln Avenue to the Loomis Road.

The yardage on this contract was exceptionally heavy, totalling 50,000 cubic yards, 2,000 of which was loose rock. As stated, the excavation was completed during the summer, but the contractors have been able to finish only 1¾ miles of the concrete due to the inability to get cement and the difficulty in procuring coal. The concrete is 20 feet wide with a total excavation of 28 feet which provides for 4-foot shoulders on either side.

Mr. Haworth's equipment consisted of two small revolving shovels, a Model 30 Marion and an 18-B Bucyrus which handled an equal amount of work. The Marion started in on the south end but was transferred about July 15 to another contract, excavating for a new building for the Allis-Chalmers Company in West Allis. The Bucyrus was cut in about the first of July on a heavy cut

A View of C. F. Haworth's Camp on Highway No. 75

on the north end of the work and completed the excavation. Mr. Haworth's other equipment consisted of 25 teams with 40 head of horses, together with twenty 2-yard dump wagons. More teams were hired during the course of the work, together with three motor trucks—one Parker and two Sterlings.

The work was over undulating country. The cuts ranged from 1 foot to 30 feet in depth and from 1,000 to 14,000 cubic yards. The heaviest cut was on the south end which called for the excavation of about 14,000 cubic yards in a cut running up to 30 feet in depth.

We publish herewith a few views of the last-mentioned cut which is about 600 feet long. This cut was taken by the 18-B, a veteran of four years in the heaviest sort of excavation. This machine

Mr. Charles F. Haworth's 18-B Bucyrus going through a 14,000-yard cut on Highway No. 75 about ten miles south of Milwaukee. Note particularly the method of keeping the shovel supplied with water. Two water wagons of 600-gallon capacity each were kept in operation, one of which was towed behind the shovel and connected directly to the shovel water tank. This saved about one hour of digging time per day.

is equipped with a 26-foot boom and an 18-foot handle. Right out of the shop she tackled a job where she loaded wagons on a 17-foot bank. The conditions at this time have not called for any unusual performance along this line.

The 40,000-yard cut, above-mentioned, was at the south end of the work where the top of a hill was taken off to make the grade easier for motorists. The cut was taken in three lifts. The first consisted of two cuts, one at either side of the old road, widening out this road to the required specifications of the cut, the wagons being loaded on the level of the caterpillars on the old road. Subsequent cuts were taken down the center line, wagons being loaded ahead of the shovel.

The average haul at this point was about 1600 feet, the material being used for fill in a low point of the road.

The output of the shovel ran about 450 to 500 cubic yards per day and 1½ tons of coal were consumed at a cost of from $10 to $11 per ton.

The road ran through some formerly timbered ground and a considerable number of stumps were encountered. Some of these were blasted with 60% Du Pont dynamite, but the majority were pulled out by the shovel.

Mr. Haworth employed an ingenious method of getting water to his shovel whereby he saved about one hour a day digging time. As a part of his equipment he had two water tank wagons with 600 gallons capacity each. One of these was constantly kept at the shovel and was towed behind it as it moved up. The water was pumped directly from this wagon to the water tank of the shovel and served as an auxiliary supply. Whenever one water wagon was empty the other was ready to take its place.

The work on this cut was under the efficient supervision of Mr. Charles Boyer, while Dick Wallis was superintendent in charge of the Marion outfit. John Gates who had been at the levers of the Bucyrus ever since it left the shops handled the machine on this job and Stanley Peters operated the Marion. Wm. Ridenbaugh was the timekeeper.

Mr. Haworth has handled many important pieces of road construction around Milwaukee and has contributed in a considerable degree to the tremendous amount of highway construction in Milwaukee County. One of his recent jobs was a 50,000-yard contract on Highway No. 41 known as Arcadian Ave., a six-mile grading job between Milwaukee County Line and the city of Waukesha.

After the contract described in this article was completed his Bucyrus machine was moved on to Highway No. 74 where he had 20,000 yards of grading between Templeton and Merton, Wis.

We are indebted to Mr. Haworth and Mr. Boyer for the information contained herein.

Douglas, Burt & Buchanan Co. Making Progress on Caddo Levee Board Drainage Canal

The well-known drainage contracting firm of Douglas, Burt & Buchanan Co. are making things hum on their enlargement work on the Twelve-Mile Bayou for the Caddo Levee Board, near Shreveport, Louisiana. This work is a continuation of their original contract which consisted of one and one-half million yards of excavation on

Section of Channel

the Twelve-Mile Bayou to Cross Bayou Channel Way, on which they used two Class-24 Bucyrus draglines. This work was completed on May 31, 1916.

The present contract consists of the enlargement of the channel way of Twelve-Mile Bayou to Cross Bayou from 75 to 115-foot bottom slopes 1½ to 1.

There are six miles of this enlargement involving over a half-million cubic yards of excavation, which they are handling with a Class-24 Bucyrus dragline with a 100-foot boom and a 3½-cubic-yard bucket.

The excavation is taken in one cut, leaving a 25-foot berm, the dragline travelling on the old

Buchanan & Company's Class - 24 Bucyrus Cleaning Out Drainage Ditches at Shreveport, Louisiana

berm. The machine cuts a perfect 1½ to 1 slope with no hand finishing necessary.

The output shows very satisfactory progress. From August 1st to August 17th, 60,000 cubic yards were moved, and an output of 80,000 cubic yards was obtained in July and September, working two 10-hour shifts per day. The material was sandy loam.

It is a point of unusual note that the contractors are burning natural gas under the boiler. The gas is piped to the dragline and is taken into the machine through a 2½-inch connection up through the center pintle.

W. E. Bryant and M. F. Hawn are operating the machine on opposite shifts.

How Bonanno Brothers Found the Land of Opportunity

Since childhood we have heard this country of ours spoken of and written about as "The Land of Opportunity." Many of us have lived to find for our own personal benefit and satisfaction wherein this is true. Some of us are still waiting patiently for this opportunity to come to us.

It is refreshing, however, every now and then to come across some striking example of how this

Anthony Bonanno, Senior Member of the Firm of Bonanno Bros.

has worked out in real life, and how such an opportunity does come to those who go out after it, and, what is more, find themselves prepared to make use of it when they find it in their hands.

Not so many years ago two young Italians came to this "land of opportunity" with this big burning hope high within them. They were burdened with no false notions of walking into riches without an effort on their part. They had a happy combination of determination, abundant energy and a unique versatility of talents to help them in their struggle.

Success came to them and today Bonanno Brothers of 132 Nassau Street, New York City, have launched out into the contracting game with every prospect of gaining their goal.

Anthony Bonanno, the senior member of the firm, has already made a name for himself. He is a member of a prominent Italian noble family, and already has proven his ability and his energy

by becoming a leader in Italian Clubs and Societies in New York. He has, furthermore, become known as an architect, musician, composer, inventor, writer and artist. He is a close student of both books and human nature, and has devoted much time to mastering the American point of view from our literature.

Their firm has been active in the real estate field, and has engaged in a wide range of activities, including architecture, construction and general contracting work, besides a general real estate business, and are now after broader fields to conquer.

That Mr. Bonanno appreciates what his adopted country has given to him is evident from the following interview in the New York Evening Mail:

Phillip Bonanno

"The foreign-born citizen of the United States," he said, "probably appreciates the advantages of this country more than the native since he has had the opportunity to compare the possibilities offered here with those in foreign countries.

"The United States today is more than ever the land of opportunity for those who want to grasp it. Here one can, if he wishes, make the most of every ability he may possess. Success is here for him if he will but work for it and he can gain a success that is possible nowhere else in the world."

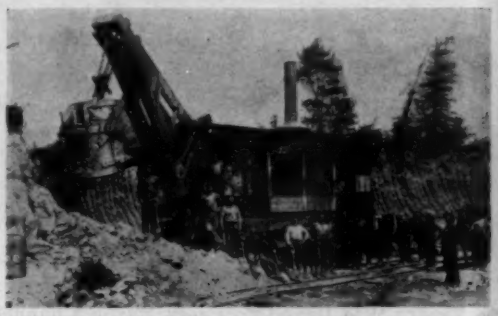
As evidence that his spirit is in the right place, he has but recently composed a march which he has named the "President Harding March" and has dedicated it to the nation's chief executive as an appreciation of the greatness of his newly adopted country.

We look for great things from these young men, and will watch their career with no little interest.

An Old Timer

We were handed the photograph which we are publishing herewith by Mr. Tom Dunlevy, one of the real old timers in the steam shovel game. This machine is an old Oswego shovel that came into the district around Hazelton, Pennsylvania, over thirty-five years ago. It was owned by Mr. J. W. Crellin of Hazelton.

It was equipped with an upright boiler, a continuous running fly-ball governed engine, which



This old Oswego shovel has made steam shovel history. It was owned by J. W. Crellin, of Haselton, Pennsylvania, and was put into operation over thirty-five years ago.

operated the thrust by means of a friction crowd. As may be seen from the teeth marks in the bank, this old machine had plenty of power and undoubtedly got away with quite fair yardages.

We are told that Mr. Dunlevy is the gentleman in the dark shirt and suspenders, standing on the shovel — not the fat bird standing beside the boom. Apparently they used large pit crews in those days, judging from the mob that are having their faces shot.

Mr. Dunlevy has had long experience in the steam shovel business. He ran a dredge for James Canan on the Welland Canal in the 70's, and at one time was master mechanic for the Kerbaugh Construction Company and for A. E. Dick.

Incidentally, it may be of interest to our readers to know that James Canan was one of the oldest dredge men in North America. He was a Canadian living in Port Colbourne, Ontario. He was well known in the early days of the dredge business not only as a contractor but as a remarkable genius. It was he who first invented the false dipper door, now used generally on dipper dredges. He also was the first man to think of the trailing spud and spud cylinders. The last mentioned were first designed to operate with cold water and later steam was applied. Another idea of his was a dipper dredge operated by three long cylinders, the center for controlling the motions of the dipper and two short ones on each side for swinging the boom. These cylinders were operated by water pumped in with a small pump. Sev-

eral manufacturers worked on the idea for some time but abandoned it as not practicable.

Furthermore John Canan has probably developed more dredgemen from deck hands, cranesmen, operators, water boys, etc., who were in his employ, than any other living man.

Care of Truck Hydraulic Hoists

By P. L. Sniffin

This is the third of a series of articles on Motor Truck Problems

Proper motor truck maintenance in the excavating engineer's business includes close attention to the hydraulic hoists on dump trucks, which form a very large proportion of vehicles in this kind of service. For this reason, the following suggestions are given, which, if carefully followed, will aid to prolong the life of the dump body.

The hoist should be examined once a week to see that the cylinder is filled with oil. To do this proceed as follows: Raise body high enough to get at hoist. Use wooden props to hold body in raised position. Pull lifting arms down by hand. Remove all pipe plugs on top of cylinder. Pour light oil in large hole on top of cylinder at rear end. With control handle in "raising" position, rotate pump by hand until oil flows out of small hole on top of cylinder, front end. This assures that all pipes will be filled and air removed. Replace all plugs tightly. Start hoist and lift body from wooden props.

If air is found in the oil in sufficient quantity to interfere with the action of the hoist, it may be removed in the following manner. Raise body and prop in position, as described above, and remove plugs. If considerable quantity of air is present in oil, be careful to loosen plugs slightly at first and allow excess of air to escape before removing plug entirely. After foaming at filling hole has ceased, pour oil in slowly, which will force the foaming oil out of holes. Also rotate pump by hand slowly to help out in the air-removing operation. Be careful to see that all pipe connections are tight, and that stuffing box around piston rod is tight enough to prevent any oil drip.

See that piston packing leather is always in good condition, and that relief valve in piston is in working order. To make sure on these points, proceed as follows: With body blocked up, drain oil from hoist. Disconnect crosshead from piston rod, remove cylinder head and withdraw piston rod assembly. Examine the upper leather packing carefully to be sure same is not cut or torn at any point. Should piston leather be cut or torn, remove and replace with new leather. Before removing piston from rod, the relief valve cage must be unscrewed from piston.

Examine relief valve and springs, being sure that spring presses valve tightly against its seat, that valve has an oil-tight bearing on its seat and operates freely in its cage or housing.

Do not decide to remove piston assembly until you have carefully checked up on quantity of oil and position of control valve and have examined carefully all pipe joints.

To ascertain whether pump is worn: Disconnect pump driving shaft, and if gears or body are badly worn it will be indicated by excessive endwise movement of shaft. On new pumps, or pumps in good condition, this shaft has only about three one-thousands of an inch end play. When replacing gasket between cover and body of pump, use very thin paper, one thickness only.

Should pump leak at stuffing box around drive shaft or control valve shaft, carefully tighten stuffing box.

In ordering any part that may be broken or missing, give hoist number shown on label plate attached to cylinder and truck number.

The Right Sort of Boss Means Loyalty Like This

The following is extracted from the Juniata Company News, a paper published by employees of that progressive Philadelphia construction outfit.

It has reference to their "Friend and Boss," Mr. R. Chalmers Jacob, President of the Juniata Company. We believe that no organization can live to reach the much coveted pinnacle of success without a spirit, such as this indicates, existing in its organization. It is just such a spirit that has brought victory on the battlefield and the football field, and it will bring success in the equally strenuous and less romantic battle of business, just as surely as the sun continues to come up in the east and go down in the west. We are for it, and for those that can inspire it!

"Mr. Jacob was born in Juniata County and hurried to Philadelphia, bringing with him the name with which to make road-building history. His ancestry is sterling American from way back and to the backbone. We suppose that because he is a lifelong Baptist, he is so partial to water; but he has no objections to his friends taking the raw injurious edge off it, with a little Mount Vernon if they can get it. We don't know when he was born, but we do know when he wasn't; it wasn't yesterday. If you think it was, try to put something over on him! But as he still has the heart of a boy, we know it wasn't many yesterdays past; beyond this we neither know nor care.

"To tell anybody in the East who is interested in roads who Mr. Jacob is and what he has done, is like telling an American Legion Post that General Pershing was in the Army. However, because we are proud of it, here goes! He began building roads when all the contractor needed was a few wagons, a few wheelbarrows, a few shovels and a foreman who kept the gang happy and busy with a pick handle. While now the only contractor who can hope to be awarded a contract where he is the low bidder is the one who can prove to an exacting and cautious Highway Department that he has a fat bank balance, a long line of credit, a plant as elaborate as the machinery exhibit at a road builders' convention, and an organization of engineers, draftsmen, surveyors, machinists and skilled laborers. Keener competition has forced a more scientific computation of costs and made bidding an exact science. In this Mr. Jacob works with

a precision almost like second sight. The only two others in the country who are as intimate with figures as he is and can do as much with them are Flo Ziegfeld and Mack Sennett.

"Mr. Jacob has seen the beginning of the modern highways departments in the East and has worked along with them. The Pennsylvania State Highway Department awarded to his company its first public road contract, way back in 1905, and the Maryland State Roads Commission at its first letting awarded him two contracts. He has built approximately two hundred and fifty miles of roads and is still building them.

"All that is necessary to complete the picture is to say that Mr. Jacob is an optimist, a Republican, a brunette, a suburbanite, a musician, and a good friend. He has two children. From what we know of him as a boss, we can imagine him as a father. We'll tell the world he must be a grand parent, all right!"

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The Business Outlook

"Economic forecast can not amount to more than a review of tendencies and a hazard of the future. The odds are favorable for 1923; the world begins the year with greater economic strength than a year ago; production and trade are upon a larger and more substantial basis, with the single exception of the sore spot in Central Europe. The healing force of business and commerce has gained substantial ascendency over destructive political and social forces. There is ample reason why there should be continued progress during the next twelve months."

The foregoing statement is taken from a circular on world conditions sent out in January by Secretary of Commerce Herbert Hoover.

Looking more particularly to the United States, we find production at the highest level since 1920, prices rising, credit easy, crops 32 per cent above last year, practically no unemployment, purchasing power increasing, profits expanding, iron output (always a valuable barometer) at peak levels, securities stronger, foreign exchange more normal, railroads more prosperous, no seasonal slump in construction, much future buying, and a practical completion of business liquidation.

But looming ahead are the following specters: Inadequate railroad facilities, uneconomic radical legislation, low farm prices, European curtailment of purchases, a coal strike, and labor shortage. Let us briefly discuss each one of these.

First, as to railroad facilities: Do not be misled by the great reduction in car shortage, whereby the peak shortage of 175,523 cars on October 28 will be practically reduced to zero by the time that this reaches our readers. For remember that from the year 1900 to the beginning of the War, the railroads purchased an average of 180,000 new cars annually. This was gradually cut down during the War to 22,000 in 1921, and has recovered only to 160,000 during 1922. Thus any present improvement in car shortage is purely temporary and seasonal. Now is the time to take advantage of the season and get delivery on supplies.

Any radical legislation directed against the railroads will complicate matters still further. It is in the interest of every contractor to do what he can to persuade his Congressman and Senator to keep hands off the railroads.

Prosperity cannot be maintained unless the farmer participates in it; and we cannot deny that the farmer is not getting his fair share of the present price advance. But it is hard to see just what can be done about this. Certainly freight plays such a small part in the price paid to the producer of food products, that a radical reduction in freight rates on farm products would do more harm by crippling the railroads than it could possibly do good by helping the farmer. Thus, in the end, even the farmer would suffer.

The price of farm products is largely influenced by the buying power of Europe, and this depends at present chiefly on the rehabilitation of Germany. Up to the present time France has replaced $2,860,000,000 of the estimated $6,630,000,000 damage caused by Germany, and yet toward this replacement Germany has contributed a mere $260,000,000. But France is more interested in security than in revenge or even in reimbursement. If the United States and England would agree to protect France against Germany in the future, the French would be willing to see Germany regain her economic strength, and Americans—particularly the American farmers—would profit correspondingly.

With regard to the impending coal strike, we can only sit tight and hope. But an ounce of preparedness is worth a pound of regret. Independent operators should now become fully equipped to take advantage of such a situation, as did the more farseeing of them last year. And

even in the absence of a strike, the continued coal shortage will make such a step worth while.

The labor supply should be carefully watched. This country has never had a serious labor shortage. In the past, each cycle of business prosperity has been brought to a close by inflation and then curtailment of credit. The present cycle will be cut short by the exhaustion of the labor supply, unless one or both of two things happen, i. e., unless (1) there is a marked increase of the utilization of modern improvements in machinery; or (2) the bars against immigration are let down. Excavating engineers can do their part to help along both these remedies, but in any event should watch the labor market as an important business index.

· FIELD NOTES ·

Instructions on Care and Maintenance of Excavating Machinery

This is the fourth of a series of articles which we intend to publish on the care and maintenance of excavating machinery. It is intended primarily for the man on the job, and we would be very pleased indeed to receive any comments, suggestions or criticisms which any experienced shovel or dragline operator might care to make.

FUEL ECONOMY AND FIRING WITH COAL OR WOOD

The operator should be in charge of the machine, and his instructions should be followed by the crew. Both he and the fireman, as well as the other members of the crew, must work together to bring about the best results.

The fireman is a very important factor in the saving of fuel and water, and can bring about this saving by burning the minimum of fuel necessary, and by taking an intelligent interest in the condition and operation of the machine.

Explaining to a new fireman the reasons why certain methods should be pursued in handling his work to bring about the best results and directing his attention to improper methods of firing will result in a saving of fuel.

When filling the boiler before a fire is started, care should be taken that it is filled only so that the water glass shows half full or water runs from the second gauge cocks. This will leave space for expansion of water, and so that the injector can be worked to prevent the safety valve from popping.

The grates should be kept clean and free from dead ashes and clinkers. The grates should be kept in a level position to prevent the fingers or edges of the bars being burned off. The ash pan must be cleaned as often as the work of the machine permits and at regular periods.

When coal or wood is applied to the fire, the volatile or gaseous matter is expelled, and if properly mixed with air and heated to a sufficient temperature in the fire box, the mixture will ignite, be consumed and pass from the fire box through the tubes and stack as a colorless vapor, leaving the solid matter on the grates in the form of coke, which burns more slowly. If the gases are unconsumed, they will produce smoke. In order to keep sufficient temperature and air to ignite the gases, the fuel should be applied in thin layers thus allowing space for live fire. Green wood contains a large amount of water which must be evaporated. This vapor cools the temperature of the burning gases, therefore the wood must be burned in a deep fire.

As soon as a few pounds of steam are available, the blower may be used to create additional draft when building up a new fire. The fire door should be placed against the latch and not left open during the intervals when the fireman obtains his second, third or more shovelfuls of coal or other fuel; thus giving an opening for the entrance of air to mix with the volatile gases and insure their consumption, eliminating black smoke. Experimentation alone will determine how long after the last shovelful the door should be left this way. Generally only a few seconds.

No hard and fast rule covering the depth of the fuel in the fuel box can be made. Good judgment must be used as conditions under which the machine is operated and the kind of fuel burned largely determines this. Large pieces of fuel do not make a satisfactory fire but fuel should be broken up before it is thrown into the fire box.

Always fire as light and as level as possible consistent with steam requirements, scattering the fuel over parts where the bed is thinnest and the fire brightest, to prevent it from becoming dead in spots. Large quantities of fuel placed in the fire box at one time cools down the fire, causes smoke and wastes fuel. Small quantities at regular intervals keeps the fire bright, reduces smoke and takes less fuel to keep up steam pressure, resulting in a reduction in the work of firing.

Heavy or uneven firing is apt to cause the boiler tube's flue sheets to leak, and may cause the fire box sheets to crack. As air cannot pass readily through a heavy fire, cold air will be drawn through the thinnest places in the fire and possibly the fire door, resulting in chilling the flues and sheets, the formation of smoke, and a reduction in steam pressure.

(Continued on page 56)

Tieton Dam under construction, August 1922. The two outer dumps are shown at an elevation of 100 feet above river channel. Tracks from all borrow pits interconnected so that material from cut is placed against core wall so equal pressures are maintained. 300 H. P. Lidgerwood cableway. The mixing plant is

Bucyrus Class-9½ Dragline Owned by the United States Reclamation Service Excavating a Ditch on a Steep Side Hill, North Platte Project

Bucyrus 30-B shovel owned by Sydney, Australia. Mr. Australian Gaslight Co pared. The material is taken out at the each

Cableway

45-ton Bucyrus Shovel

Concrete Bucket

Core Wall

Lower Fill

Adit for Head of Power Flume

Lower Portal

...al river bed at the location of the dam. The core wall is about 200 feet in height above the bedrock of the ... be delivered at any point on either dump. This is in order to control character of ... bucket is shown dumping concrete into core wall. This is handled by ... and directly under cableway. See article page 43.

...Solomon, in operation near ... struct a gasometer for the ... site that is being pre- ... to shale, and stone ... loads of ¾-yards ... day.

The Raven Block Coal Company of Mulberry, Kansas, are operating an 80-B Bucyrus shovel, with a 41½-foot boom and a 2½-cubic-yard dipper for stripping their overburden. The shovel is here shown cutting down to the box cut which is 40 feet in width. Their stripping averages 13 feet in depth with a maximum of 18 feet, consisting of earth, shale and slate. The coal deposit is 18 to 20 inches in thickness, is loaded into tram cars by a Keystone loader, and hauled to railway cars. A. W. Roy is Superintendent and Robert S. Wilson is operating the Bucyrus.

The smoke box, its door and the stack should fit tight. Care should be taken to prevent holes rusting through the smoke box and stack. If the smoke box or stack have holes in them so that air leaks, it will allow the gases to cool and thereby decrease the draft. This condition often causes a poor steaming boiler, and is one which should and can easily be remedied.

The fire should be shaken or cleaned only when necessary to clear it of ash and clinker in order to admit sufficient air for proper combustion. Shaking or cleaning should be done carefully to avoid the loss of a good fire. The grates should be placed after each shaking or cleaning in a level position, to avoid burning the fingers, which will occur if the grates are allowed to remain at an angle with the fingers projecting into the fire.

The exhaust nozzle in the stack of forced draft boiler should be located in the center of the stack so that the exhaust strikes evenly the sides of the round part of the stack, otherwise the boiler will not steam properly.

Waste of steam through safety valves should be avoided. Frequent blowing off of safety valves indicates poor firing, and economy is not being practiced.

Fuel can be saved by the proper use of the injector by feeding the boiler regularly at a rate governed by the demand, and by taking advantage of every opportunity to increase the height of water level when not working the machine to full capacity.

The water level should never be high enough to allow water or very moist steam to be carried through the steam pipes, the valve chambers and cylinders, because it will carry off the lubricant for these parts, and may result in serious damage, due to knocking out cylinder heads, breaking pistons or bending the connecting rods of the engine.

When banking or cleaning fires, the blower should be used as little as possible, to avoid rapid cooling of the fire box and flues, which may cause leaks.

When cleaning fires, or with a banked fire, the excessive use of the injectors must be avoided, as the introduction of an excessive amount of water at such times will result in injury to the flues because of rapid reduction of temperature of the water in the boiler producing contraction without sufficient heat in the fire box to counteract this effect.

After the fire has been cleaned of ash and clinker, the clean fire should be placed at the flue end of the fire box, and maintained in good condition by applying small quantities of fuel as may be required to prevent cold air from passing through the flue end of grates and injuring the flues.

Do not open the fire door too soon after banking a fire as the cold draft will damage the tubes. Twenty minutes at least should pass after banking the fire before opening the door. Always close the draft doors when you want a banked fire to last over night.

Almost any fire can be clinkered by stirring it up with a hook so that green coal gets down on the grates. A fire can also be clinkered by shaking the grates so hard that green coal works its way down through the fire. With certain classes of coal, heavy firing which causes banks to form in some portions of the fire will start clinkers. When a clinker has formed in a fire box it can sometimes be broken by shaking the grates with short, quick jerks, but as a general rule the fire must be cleaned to get rid of it. Trouble due to clinkered fires can be materially reduced by not shaking the grates so hard, not using the hook or slice bar so often, and by careful firing to prevent the formation of banks in the fire.

Listed below are a few "don'ts" which have come to our attention.

Don't forget the rules attached to the steam gauge.

Don't forget to look at the water gauge or try the gauge cocks when first starting to work.

Don't fail to regulate the running speed of the boiler pump or injector to suit the requirement of an even water level. A constant feed is best if it can be so regulated.

Don't forget your regular times for firing and for cleaning fires. Don't allow holes to burn in the fire bed.

Don't forget to try the safety valve every day.

Don't let the ashes accumulate under the grate —choking burns the bars; have stated times for cleaning.

Don't forget to regulate the dampers and doors to produce an even rate of combustion; if automatic dampers are in use they should be examined often.

Don't neglect to blow out the steam or water gauge connection and the pressure gauge connection as often as needed to keep them free from obstruction.

Don't forget to see that the blow-off valve is clear of obstruction after cleaning boiler by drawing water through it.

Don't neglect to pump up your boiler to the upper gauge line when stopping the machine at night. Start the pump before closing the throttle.

Don't forget to anticipate stopping the machine at night by partly closing the draught doors, opening the dampers, and spreading a little coal over the fire to prevent the sudden rising of the steam pressure after stopping the work. Then clean and bank the fires.

Simple Method of Checking Grade on Shovel Work

Have you ever worried whether your shovel was keeping the correct grade given by the engineer?

Here is a quick and simple method of checking yourself. When you start in on a cut you are ordinarily sure of your grade. It is only later that you might begin to be doubtful as to how you are holding it. When you have obtained your grade, therefore, thrust the dipper of your shovel out to the stops and drop it to the ground, then have someone measure with a string the length of rope you have out between the pin of your padlock and the center of your point sheave on the boom. Make note of this figure. It is obvious then that if you are not keeping to this grade you can tell by measuring your rope again and comparing it with your first figure, providing you do it before you have moved up. If this figure is greater you are taking too much of a cut; if it is less you are taking too thin a cut.

It is not difficult for a shovel runner to work up a table of such figures for the usual grades, which will prove of great assistance to him in the future.

Another variation of this method is to tie a piece of string around the hoisting rope where it touches the sheave on the point of the boom. Any variation from your grade may be noted by watching this string and noticing its position relative to the sheave. These methods are both rough, but they are good.

A Simple Method of Rust Prevention

When your shovel is to be stored for any length of time in the open, one excellent and inexpensive method of preventing the rusting of working parts is to cover these parts with ordinary turpentine of the cheaper grade. This method has been found to be particularly effective in the tropics where the metal will often rust in twenty-four hours.

DEVICES YOU OUGHT TO KNOW ABOUT

The Bates Machine and Tractor Company Announces Their New Bates "40"

The Bates "40" which is the latest addition to the Bates Steel Mule family incorporates several new ideas for this class of equipment.

It has four speeds forward, namely: 1 4/10 miles per hour; 2 1/3 miles per hour; 3½ miles per hour and 5¾ miles per hour, which gives a range of speed for all classes of work.

The Bates "40"

When a tractor is used on a job it becomes the pace setter for the rest of the work. The Bates "40" can work at a faster pace because it has more operating speeds for each class of work.

The Bates "40" has two working speeds for slow, heavy work, 1 4/10 miles per hour and 2 1/3 miles per hour. It also has two working speeds for the lighter jobs, 3½ miles per hour and 5¾ miles per hour. Four speeds in all, as slow a speed as you want to go, and the fastest speed of any road-building tractor in America. This ability to always work at the fastest pace for the job also speeds up the other work depending on it.

The size of the peak load to be handled determines the size tractor a contractor must purchase. Just to take care of a few tough spots that are a little too strong for a medium sized road tractor, it has heretofore been necessary to buy a second and much larger tractor.

The Bates "40" having over 6500 pounds drawbar pull has the pulling qualities of a large road tractor and yet the economy and low operating cost of the medium sized road tractor. It has the big pull when you need it, but when working at the average load it is the right weight to operate most economically. In most places it can take the place of either a large or medium machine.

The weight of 8500 lbs., which with a Crawler traction area of 1680 square inches, gives maximum traction and will not injure the roads.

The Midwest motor is used, which has over 55 brake horse power. It has a three-inch crankshaft and an oil pressure control whereby the oil supply to the bearings is controlled by the load on the tractor instead of the speed. The Bosch Magneto is used for ignition. The steering is accomplished by large multiple plate clutches, actuating on either crawler, with the addition of brakes for

short turning when running without a load. It can be turned in its own length. The clutches are operated by a cross bar with vertical handles, supported on a rigid steering column. The leverage is such that the tractor is steered with ease. The two brake pedals are equipped with locking mechanism for locking the tractor on a grade.

The motor clutch is operated by a ratchet hand lever of greater length than ordinarily used, which makes it very easy to operate. Nickle steel roller bearings are used throughout the entire machine. Every bearing is dust-proof and runs in a bath of oil. The Crawler truck wheels and front idler wheels are steel. The driving sprockets have crucible steel hubs and spokes, with detachable manganese outer ring carrying the sprocket teeth.

The Crawler frames are spring mounted and are free to oscillate independently of each other through an oscillating bar pivoted in the center of the tractor. The frames are built of heavy channel steel and are rigidly braced, thereby eliminating any chance of misalignment. The Crawlers are of steel with carefully hardened bushings and pins pressed into the shoes. They are the same general design as those used on the Bates Steel Mule which have proven so efficient.

The radiator is the honeycomb type, with a heavy cast-iron shell, equipped with heavy guard bars. An important feature is the great clearance above the ground, it being 14 inches to the lowest point. A large coil spring is incorporated in the drawbar which takes the shock when starting a heavy load. The operator's seat is more than wide enough for two people and is well upholstered. The cushion is removable, and is constructed the same as an automobile cushion. It is built by the Bates Machine and Tractor Company, Joliet, Illinois, who has been building Crawler tractors and other high-grade machinery for years.

New Titan Trucks for 1923 with Counterbalanced Engines and Reduced Prices

In addition to equipping all models with a new counterbalanced truck engine, the Titan Truck Company has been able, by reason of greater manufacturing of its own units and other economies, to substantially reduce the prices on its trucks.

These new engines are three to five years in advance, and give a plane of performance heretofore unexperienced in the truck field for smoothness, quietness, power, long life and economy; an engine of vastly superior design, with *counterbalanced crankshaft,* machined combustion chambers, heat radiating bearings, etc.

	The New Prices	The Old Prices
2 to 3 Ton Model	$2700.00	$2950.00
3 to 4 Ton Model	3600.00	3950.00
4 to 6 Ton Model	4100.00	4550.00

In view of the increased quality and manufacturing cost of the engine, and the incorporation of the Titan Central Double Reduction Rear Axle, the most efficient and strongest type axle known to the industry and *guaranteed* by us for *two years,* the above prices represent the greatest truck value ever offered the public on a line of high-grade trucks.

Aluminum, alloy steel and cast steel have been substituted generally for other metals, reducing chassis weights 1500 to 2000 pounds.

Further information may be obtained from the Titan Truck Company, Milwaukee, Wisconsin.

Purchase Tractors to Speed Up Big Texas Job

Work is now under way in full blast on the Big Wichita Irrigation Project for the Wichita County Water Improvement, near Wichita Falls, Texas.

Callahan & Walker's Best "Sixty" Tractors in action. Five-yard La Plant-Choate trailers were used on this job.

In general the work consists of the construction of diversion and storage dams, and about forty miles of canals to provide water for about one hundred and fifty thousand acres of land. The contracts amount to $4,500,000.

Part of Maney Bros.' Outfit. 42 miles of ditch must be completed by February 1923. A negro is running this Best Tractor.

The fact that this big mileage of ditches had to be completed within a year lead the contractors, Callahan & Walker and Maney Bros., to install the most modern hauling equipment available. The result was the purchase of five Best "Sixty" tractors, illustrated herewith. These tractors were built by the C. L. Best Tractor Company, San Leandro, California.

SHOTS FROM THE FIRING LINE

Central States Notes

John Williams is operating a Bucyrus 225-B for the Cadiz Block Coal Company at Cadiz, Ohio. Chas. W. Wenner is superintendent on the job.

Tyson Hendricks is operating a 20-B Bucyrus shovel for R. M. Netherland in Pittsburgh. Mr. Netherland is very active around Pittsburgh and is moving his shovel from job to job with great frequency.

Chambers Corporation is operating a 20-B Bucyrus at West Elizabeth, Pennsylvania. They are stripping an outcrop of coal on a side of a hill in a cut about 200 feet long, 15 feet wide and 10 feet deep on the high side and are taking about 5 feet of coal. The shovel is double shifted. F. C. Gilmore is at the levers during the day time with M. S. Apple as fireman.

Charlie Stoner, of Sturgis, Kentucky, has recently purchased a 14-B Bucyrus from Beck & Babb and reports that his work is getting along nicely.

Hamilton & Gleason have 25 miles of double track work in Arizona for the Santa Fe. There is about one million yards on the job. They have two 70-C Bucyrus shovels and a Bucyrus 50-B to do the work with.

The Calhoun Coal Co., Calhoun, Illinois, are developing a strip mine on their property near town. Allen Stone and Don Foote are in charge of the work at the pit, and are using a small Erie shovel. They recently purchased a 50-B Bucyrus that will be on the job by the time spring opens up, and they expect to dig coal in earnest.

Eastern News

BY E. G. LEWIS, NEW YORK

The city of Hornell, New York, plans the paving of Telyea and Adelaide Streets at a cost of $100,000.

Condon, Jacobson & Cole and Sam Smith, subcontractors on the Walsh Construction Company's job at Feura Bush, New York, are making good progress. The total of their yardage runs in the neighborhood of two million yards, and both of these companies are working at 100% efficiency.

It is reported that the Chesapeake & Ohio will have another large contract coming up within the next few months at Clifton Forge, Virginia, involving the handling of about one million yards of material.

Wilson & English Construction Company was awarded an excavation contract at Altoona, Pennsylvania, this month. They are already in charge of work at this point for the Pennsylvania Railroad, and it is reported that on account of having their plant on hand they were able to give the Pennsylvania Railroad a very low price for the additional contract.

Henry B. Crawford, Manager of Construction, Hugh Nawn Construction Co., Boston, Massachusetts, has approximately one-half million cubic yards earth excavation to sublet for steam shovel outfit, and additional yardage for 12 dump wagons and small shovel outfits — two-year contract.

Gibbs-Mueller Construction Company of Philadelphia have finished their highway job in Northern Pennsylvania, and have brought their outfit in for the winter.

Heyman & Goodman report that they will finish their New York State work before they start on their New Jersey tunnel contract.

It is reported that the Central Railroad of New Jersey will raise the road level from nine to twelve feet between Raritan and Bound Brook. It is not yet decided when bids will be asked for this work.

The Chesapeake & Ohio Railroad received bids on a large double tracking job on December 1st. The bidders on this work are as follows: Pitts & Morris, Roanoke, Virginia; Boxley Brothers, Huntington, West Virginia; J. D. Ballard, Bedford City, Virginia; Simon Curtis, Lee Hall, Virginia; John Lane, Alta Vista, Virginia; J. C. Carpenter & Major Brothers.

The Delaware State Highway Department has just closed the most successful construction season in its history. In the face of the general car and material shortage the Department has completed 73.6 miles of state highway, or 98 per cent of the mileage under contract.

This would be a small program in many states, but when one realizes that this is approximately 2 per cent of the entire road mileage of the state, it is seen to be no mean accomplishment.

Northwestern States News

BY A. R. HANCE, PORTLAND, OREGON

At a meeting of the Oregon State Highway Commission bids were opened on 23.3 miles of road projects and a wooden truss span bridge over Lost Creek on the Willamette Highway. The following were awarded contracts for the various contracts:

The construction of 2.2 miles of paving on the Tangent-Shedd Section of Pacific Highway to Mr. A. D. Kern whose bid was $50,606. He also was awarded the contract for the construction of .9 miles of paving on the Rainier City Section of the Columbia River Highway. His bid was $23,713.25. Also for the construction of 7.4 miles of crushed gravel or broken stone surfacing on the Sandy-Cherryville Section of Mount Hood Loop Highway. His bid for this work was $24,336. Mr. Kern is a contractor of Portland, Oregon.

Soleim & Gustafson, contractors of Astoria, were awarded the contract for .62 miles of paving on the Murder Creek Section of Pacific Highway. Their bid was $15,273.20.

A. C. Mathews, Eugene, Oregon, was awarded the contract for 4.12 miles of grading and surfacing on the Goldson-Cheshire Section of the Willamette Valley-Florence Highway. His bid for this work, which involves 23,000 cubic yards of excavation and 9900 cubic yards surfacing material, was $40,920.

The Warren Construction Company of Portland, Oregon, has the contract for the building of the Goshen-Lowell Section, Willamette Highway, which involves 4.1 miles grading and surfacing, including 23,000 cubic yards of excavation and 9900 cubic yards surfacing material. The bid, which was the lowest of those submitted, was $82,571.

Mr. E. D. Olds, Oak Grove, Oregon, received the contract for the Goshen-Lowell Section, Willamette Highway, Lane County, bridge over Lost Creek. His bid was $9,033.50.

The Warren Construction Company submitted the lowest bid on the Central Oregon canal flume, bids for which were opened on December 11.

Only two bids were received by the Bureau of Roads at Goldendale, Washington, on the construction of 5.1 miles of earth road. They were: Siems & Carlson—With sawed guard fence, $56,285.90, with rustic guard rail, $56,085.90; Chris Sauset—With sawed guard fence, $47,418.50, with rustic guard fence, $47,918.50. This work involves considerable excavation and clearing.

The California State Highway Commission awarded the construction of the big road contract in Glenn County, between Willows and a point three miles south of Glenn, to V. R. Dennis, McMinnville, Oregon, whose bid was $124,149.80. There is 1.19 miles to be graded and surfaced with gravel, involving 27,500 cubic yards excavation without classification and 41,200 cubic yards gravel surface. The Commission will furnish reinforced steel corrugated metal pipe and cement.

Bids were received January 2 at the office of the Long-Bell Lumber Company at Kelso for the construction

of the first unit of 8½ miles of a contemplated 30-mile railroad. The road which will be begun at once when completed will connect with the Northern Pacific south of Longview at the Cowlitz River and run 26 miles up the river to the Long-Bell timber holdings. There were 12 bids received from some of the largest railroad contractors in the West on this first project, which involves approximately the following work: 153,580 cubic yards common excavation, 39,300 cubic yards loose rock excavation, 59,300 cubic yards solid rock excavation, 222,660 cubic yards embankment borrow, 649,710 station yards overhaul. Also several hundred linear feet of concrete culvert pipe of various dimensions and considerable piling and lumber for trestles.

During the past year the forest service of the United States Department of Agriculture made allotments of $448,308 for the construction of 644.19 miles of roads in Oregon and Washington. Figures just received from Washington show to date a total expenditure of $22,215,-724 for the construction of 4786 miles of roads, 6711 miles of trails and the maintenance of 3007 miles of roads and 5737 miles of trails.

Pacific Coast News

BY P. H. BIRKHEAD, SAN FRANCISCO, CALIFORNIA

Contract has been awarded by the Santa Fe Railway Company, Kerchoff Building, Los Angeles, to Sharp & Fellows Contracting Company, Central Building, Los Angeles, for the construction of approximately 70 miles of railroad from Bagdad, San Bernardino County, to Daggett, San Bernardino County, work involving 2,000,000 cubic yards of material, including embankment placed. The Sharp & Fellows Contracting Company have sublet the entire project as follows: Steam shovel work to Hamilton & Gleason, Denver, Colorado; Concrete and bridge work to Gibbons & Reed Co., Kearns Building, Salt Lake City.

Team Work awarded to the following: James Martin, 789 Lyon Street, Los Angeles; W. J. Burton, 4534 Homer Street, Los Angeles; Leroy Little, Calexico, Imperial County; Anderson Bros., Calexico, Imperial County; Cashion-Caldwell Construction Co., Phoenix, Arizona; Jewett & Souter, Bakersfield, California.

R. B. Ball is chief engineer of the Santa Fe Railway at above address.

Plans are being completed by Project Manager J. F. Richardson and Engineer A. W. Walker, of the Reclamation Service, for the construction of the Spanish Springs Reservoir for the Newlands Project. The Dam will be an earth-fill type, involving 1,700,000 cubic yards earth; estimated cost, $4,000,000.00.

Contract has been awarded to Charles Thompson, Hotel Clark, Los Angeles, for the following: Raab Cutoff—Palo Verde Levee District, Blythe, California, 247,220 cubic yards excavation, $0.25 yard, 125 acres clearing; Hauser Cutoff—195,700 cubic yards excavation, $0.25 yard, 75 acres clearing; Casad Cutoff—81,200 cubic yards excavation, $0.18 yard; total bid $153,406.

Contract has been awarded to P. B. Engh, Palo Verde Levee District, Blythe, for the following work: Raab Shoofly—341,500 cubic yards earthwork, $0.18 yard; 341,500 cubic yards team embankment, 30 acres clearing and grubbing; total bid $57,420.

Preliminary plans are being made by County Surveyor of Sutter County, Edward Von Geldern, Yuba City and County Road Engineer, Drury Butler, Sacramento, for the construction of the proposed joint highway for Sacramento and Sutter Counties, to be 26.48 miles in length, extending from the north end of the Natomas Boulevard to Oswald in Sutter County, total estimated cost, $600,000.00.

Plans have been completed by City Engineer Albert Givan, and will shortly be presented to the City Council, with reference to the construction of the 16th Street Subway, estimated cost $80,000.00. Cost is to be borne equally by the City and the Southern Pacific Company. The Railroad Commission has authorized the construction of the Subway.

The following contracts have been awarded by the Nevada State Highway Commission: Lincoln County from Ploche to Stone House, 13.51 miles grading, awarded to Kroft & Bundy, Ogden, Utah, $43,961.00, next lowest bid Wasatch Grading Co., Provo, Utah, $69,587.00; Eureka County from Hay Ranch to Eureka, 11.15 miles of grading and graveling awarded to Nevada Contracting Co., $77,-152.00, next low bid $87,055.00, Dodge Bros. & Dudley, Fallon, Nevada.

Report has been submitted by Chief Engineer C. C. Gragin, and approved by Board of Directors of the Salt River Valley Water Users Association, Phoenix, Arizona, and bonds election will be held January 4, 1923, to vote on issuing bonds in the amount of $1,800,000.00 to cover the cost of the following: (1) Increase capacity of Roosevelt Reservoir 270,000 acre feet by installing 15 gates in the spillway; (2) Remodel plant, removing obsolete portion of present installing and constructing new 7500 K.V.A. unit; (3) Constructing Mormon Flat Dam with regulating capacity of 90,000 acre feet.

Plans are being completed by Bureau of Public Roads, United States Department of Agriculture, 881 Mills Building, San Francisco. C. H. Sweetner, Chief Engineer. Bids will be called for about January 1, 1923, to be opened during February, for the grading of from 3½ to 4 miles of the Salmon River Project, Siskiyou County, work involving approximately 130,000 cubic yards excavation, 12-foot roadway.

The following contracts have been awarded by the California Highway Commission, Sacramento: Fresno County, 8.9 miles of grading, between Parkfield Junction and Coalinga, awarded to C. Miles, 2509 L. Street, Sacramento, who bid $120,803.00; Placer County, 5 miles between Roseville and Lincoln, to be surfaced with asphaltic concrete, awarded to J. A. Costello, Jr., 1083 Shotwell Street, San Francisco, who bid $35,530.00; Glenn County, 11.9 miles between Willows and a point 3 miles south of Glenn, to be graded and surfaced with gravel, awarded to Dennis Construction Co., McMinnville, Oregon, who bid $124,149.00.

The University of California Board of Regents have recently awarded Bates & Borland, Oakland contractors, a contract for the construction of the first unit of the new University Stadium. The estimated cost was $335,-000.00 nearly half the estimated cost of the entire structure.

At a meeting held the latter part of January in San Francisco, the finishing touches were given to the Columbia Steel Corporation. The purpose served by this organization was the consolidation of the properties, plant and business of the Columbia Steel Company, operated at Pittsburg, California, and Portland, Oregon, with the properties of the Utah Coal & Coke Company, and a huge iron ore deposit in Utah. The new corporation which is capitalized at $20,000,000, divided equally into preferred and common stock, will expand the plants of the Columbia Steel Company at Pittsburg, California, by increasing the scope of the open-earth capacity, and adding to the mills already built, sheet and wire mills to meet the requirements of the Coast markets. In addition the company will construct on a plant site between Provo and Springville, Utah, a blast furnace and by-product coke-oven plant for the making of pig iron to supply the pig iron requirements of the new mills, and the general market for merchant iron on the Pacific Coast.

Plans are being prepared by the Santa Fe Railway, R. B. Ball, Chief Engineer, Kerchoff Building, Los Angeles, for the double tracking of 137 miles of the Santa Fe System between Albuquerque, New Mexico, and Los Angeles, work to be done during 1923. Estimated cost approximately $7,500,000.00.

G. H. Rollings is operating a Marion shovel for the Utah Copper Company at Bingham Canyon, Utah.

Southern States Notes

BY C. N. BALLENTINE, BIRMINGHAM, ALABAMA

W. T. Taylor of Wilsonville, Alabama, was recently awarded twenty-three miles of road work in Shelby County on the Birmingham-Montgomery Highway. Mr. Taylor's sons are associated with him on this work and are moving their outfits preparatory to begin moving dirt at an early date.

The bid of the Clark Dredging Company for dredging Key West Harbor has been accepted and work will commence in a short while.

Taxpayers of Morehouse Parish, Louisiana, recently voted overwhelmingly in favor of the bond issue of $1,150,000 for building 150 miles of highways in this parish. It is expected that bonds will be sold within two months and the work started soon afterwards.

List & Gifford report satisfactory progress on their work near Dallas, Texas. They are using a Bucyrus Class-14 on caterpillars to handle the material.

Jim Burke is craning a 70-C Bucyrus for the List & Gifford Construction Company. Porter Harrison is handling the levers and Charley Mack firing. Jim would like to hear from W. H. Darraugh and can be reached through the Dallas office of the above company.

Moore Bros. Carr Company of Nashville, Tennessee, were recently awarded six miles of Kentucky rock asphalt on hand-placed base in Sumner County.

Funds for the completion of Dam No. 2 and the installation of eight power units of the Muscle Shoals Development are provided in the army appropriation to the House of Representatives. Under this plan the Government would complete the development of the shoals without regard to the offers of Ford or other private interests and much opposition to this plan is expected.

Verne Hardy is operating a dragline for Hutchinson & Oakford at Dermott, Arkansas.

St. Louis Items

BY A. B. KOENIG

Roth Bros., Ottumwa, Iowa, have a steam shovel outfit that they would like to place on work, or lease, immediately.

Ira J. Printy finished his work at Menfro, Missouri. He is moving his outfit on to a State road job in Iron County, Missouri, that he subbed from J. P. Sparks.

A. M. Perdeu came in to look over the mule market here. He is working on 18 miles of State road work between Clarendon and Blackton, Arkansas.

Keeley Bros. of East St. Louis have been awarded the contract to complete the State road between East St. Louis and Cahokia. Their bid was $75,000. When their part of the road is finished there will be a hard road between East St. Louis and the cities on the old Kaskaskia trail, beginning with Columbia and Waterloo and going southward to the old state capital.

Harrington Bros. have placed an outfit on the new Frisco yards near Lindenwood, Missouri.

Keating Bros. have a good 20-team outfit idle at Carlyle, Illinois. They are in the market for any kind of grading.

Mulvill Bros., Alton, Illinois, report 3 shovel outfits idle.

J. J. McInerney completed his grading contract at Wanda, Illinois. His outfit is lying idle there now.

A. V. Ely, County Highway Engineer of Marion County, Missouri, has been appointed State Maintenance Engineer for Division 3 with jurisdiction over the following counties: Lincoln, Pike, Audrain, Rails, Monroe, Marion, Shelby, Lewis, Knox, Clark and Scotland. He will have headquarters in Hannibal, Missouri.

The Northern Dredge & Dock Co. of Minneapolis is dredging for a condensor pit and putting in streets and yards for the new Union Electric Light & Power Co. plant south of the Free Bridge in East St. Louis. Have at least a year's job.

The contract for grading the state highway between California and McGirk, in Moniteau County, Missouri, for a distance of 7.32 miles has been awarded to I. W. Newton of Eldon, Missouri, for $36,293.

J. G. Kenan, formerly with T. P. Clifford & Sons, has incorporated the J. G. Kenan Co. with offices at 4300 Euclid Building, Cleveland, Ohio.

Coopers Construction Co., 806 Federal Reserve Bank Building, St. Louis, Missouri, have 30,000 yards of state road work in Howell County, Missouri, to sublet.

The Missouri Valley Bridge & Iron Co. have been awarded contract for constructing a bridge over Black River near Luehrman, Arkansas.

J. J. Dunnegan Co. started work on their sewer contract in Cape Girardeau, Missouri.

Cameron, Joyce & Co. of Keokuk, Iowa, were low bidders on a number of road jobs at the Springfield, Illinois, letting on December 21, 1922.

W. C. McNeely Co. got in on several Illinois road jobs at the Springfield letting on December 21, 1922.

Jones & Jordan are making rapid progress with their state road job near California, Missouri.

Contractors when in want of work or labor for their outfits write or wire Koenig Labor Agency, 612 Walnut Street, St. Louis, Missouri, or 501 Delaware Street, Kansas City, Missouri.

Cameron, Joyce & Co. were awarded contract by Burlington Railroad near Sorento, Illinois, about 100,000 yards of machine, wheeler and fresno work. They will sublet this. This firm also were awarded a nice grading job in western part of St. Louis, which they sublet to Lane & Maloney.

J. W. McMurry Contracting Co. finished their bridge job across the River Rouge at Detroit. They are moving several concrete outfits on the Frisco Railroad south of St. Louis.

Brooks Construction Co. were awarded contract for building a dam at Hamilton, Texas.

A. J. Brady is finishing 12 miles of State road work in Illinois. He wants a grading job for a 10-team outfit.

Canada

Vancouver Notes

BY J. C. MOON

Deputation from New Westminster, British Columbia, Board of Trade, headed by E. A. Riddle, met the Delta Council at Ladner, British Columbia, and discussed proposal to pave the Scott Road and complete paving from East Delta to Westminster bridge, at cost of $240,000. Provincial Government to pay half the cost and Surrey and Delta municipalities a quarter each.

Survey has been made of 80-mile gap between Princeton and Hope, British Columbia, of Trans-Continental Highway between Winnipeg and Vancouver, and roadway work will commence on it in spring. The only other gap in this highway is one of 19 miles between Rossland and Cascade. There will be much rock work on the former gap, and it will require at least two years for completion.

The sum of $50,000 will be spent by the Provincial Government on a survey of iron ore resources of British Columbia, under the provisions of a bill introduced in the Legislature by the Minister of Mines, to ratify the agreement between the Province and the Dominion to carry on jointly this work.

Charles F. Caldwell, president of the New Alaska Mining Co. and the Portland Canal Railway & Terminal Co., has arranged with C. A. Carlson, of the Siems-Carlson Construction Co., of Spokane, Washington, for construction of a railroad from Hyder up the Salmon River Valley.

Contract for construction of Collingwood storm sewer was awarded to James Slater, Engineer, Vancouver and District Joint Sewerage and Drainage Board, who submitted the lowest tender at $157,676. Tenders for supplies will be called for at once.

Federal Government has handed over to the Vancouver Harbor Commission the operation of the grain elevator here. Harbor Board will likely proceed with erection of another grain elevator of large capacity.

Ratepayers passed by-law authorizing the participation of North Vancouver in the cost of construction of the proposed Second Narrow's bridge to span Burrard Inlet between Vancouver and North Vancouver.

Early next year the Canadian Pacific Railroad will undertake the opening up of a tract of land between Granville and Maple Streets from 31st Avenue to 41st Avenue, Point Grey, British Columbia, which will necessitate construction of sewers at a cost of $57,197.

Eight miles of Pacific Highway, extending from New Westminster to the border, remain to be completed, paving of which will probably start next spring.

A. F. Proctor, chief engineer of the Department of Railways for British Columbia has resigned.

City Council of North Vancouver, British Columbia, passed a resolution favoring the erection of a government grain elevator on the North Shore.

Contract for construction of Canadian Pacific Railroad pier at Vancouver, British Columbia, estimated to cost between $1,500,000 and $2,000,000, has been awarded to Sydney E. Junkins Co., Winnipeg and Vancouver. Work will start at once.

Winnipeg and Vicinity

BY F. X. AMOS

Contract for the construction of cutoff at Long Lac, northeast of Port Arthur, on the Canadian National Railways, has been let by the Board of Directors to Foley, Welsh & Stewart. The cutoff is about twenty-five miles in length and will mean a very much shorter haul between Winnipeg and Toronto. The contractors are already putting men on the job and expect to rush the work through to its completion.

The completion of the first unit on the Great Falls Water Power Plant has been made and the work is being pushed rapidly on the remaining ones.

Sir Henry Thornton, Head of the Canadian National Railways System, and several members of the Board of Directors, are making an inspection trip over the Western Lines of the System. A very careful survey of the trunk lines and branches is being made with a view to effecting economy where possible and to making extensions where advisable.

Mr. Thomas Sharpe has been elected President of the Builders' Exchange, Winnipeg, Manitoba.

Major H. B. Muckleston has been appointed Manager of the Lethbridge Northern Irrigation Project for a period of one year. Major Muckleston has been Chief Engineer in the construction of this work.

Canada produced over fifteen million tons of coal during 1921 of which about two million tons were exported. No coal mined in Western Canada is consumed in the East owing to the heavy freight rate.

Montreal and Vicinity

BY J. M. WARD, MONTREAL

The St. Regis Paper Company of Canada, Limited, Montreal, propose erecting a new wharf and mill at Godbout, Quebec.

Town Council of St. Marie de Monnoir, Quebec, contemplate the erection of a bridge this Spring.

A new hospital to cost $500,000.00 is to be erected at Quebec this year.

The Board of Education of Fredericton, New Brunswick, contemplate erecting a new high school building.

The New Brunswick Electric Power Commission, Prince William Street, St. John, contemplate a development of hydro power at Grand Falls, New Brunswick. It is estimated they will develop from 35,000 to 60,000 H.P., and expect to transmit power for 200 miles.

A new basilica costing $500,000.00 is to be proceeded with at once to replace the one recently burned at Quebec City.

Foley Bros. & Hervey have been awarded the contract for 29½ miles railway construction for the Canadian National Railways, from Long Lac to Nakina, Ontario. This contract is for the grading, culverts and bridges; the track laying and ballasting will be done by the Canadian National Railways.

A new highway bridge is contemplated at Grand Mere, Quebec.

The New Brunswick Electric Power Commission, St. John, contemplate a $500,000.00 hydro power development at Nepisiquit Falls, New Brunswick.

The Quebec Development Company at St. Joseph d'Alma, Quebec, has started to work on a big power development. This job is expected to last several years, as what they are starting now is merely an initial development. Their contract calls for delivery of power within two years. This is one of the biggest power development jobs that has been undertaken since the hydro-electric power development of Ontario.

Johnny Ostler, old-time steam shovel runner, was in to see us recently. He says the new 20-B Bucyrus for him.

Louis Ott of Messrs. L. A. Ott & Company, Montreal, has just purchased a new 20-B Bucyrus high lift shovel on caterpillars, which he intends to do a lot of work with this coming season.

The following firms have been awarded road contracts for the Provincial Government of Quebec: A. Heon & Company, Three Rivers; T. E. Rousseau, Quebec; Ulderic Paris, Deschaillons, Quebec; Universal Contractors, Inc., Montreal; Nicolet Construction Company, Nicolet.

Toronto and Vicinity

BY N. DE WIND

The affiliations of Foley Brothers, Toronto, Ontario, the well-known International Contractors, have recently been pulling off some of the big works in Canada. Foley Brothers & Hervey have been awarded the contract for the Canadian National Railways thirty-mile cutoff at Long Lac. The contract we understand covers clearing, fencing, grading and ballasting.

The same interests, Foley, Welsh & Stewart, are reported to have undertaken the erection of a $3,000,000.00 pulp mill in the Grand Prairie district of British Columbia.

It is reported that the Dominion Government will shortly let a contract at St. Catharines, Ontario, for Section 8 of the Welland Ship Canal so that work can start early in the spring of 1923.

The Provincial Highway Department of Ontario will receive bids at Toronto, Ontario, until February 12th on upwards of 40 highway contracts. Of these about 13 are for grading, representing from 55 to 60 miles of work. These grading contracts are numbered 802 to 815 inclusive.

The electrification of certain parts of the Canadian National Railways seems to be finding favor and it is reported that the Directors will shortly have before them a report on the electrification of the Toronto-Niagara Falls district. It is also understood that a petition has been sent in from Guelph, Ontario, covering portion of the Grand Trunk as an alternative to building an extension to the present electric suburban railway. Undoubtedly with the enormous water power development all over Ontario, development of better suburban traffic on all the standard railways could be considerably advanced.

Mr. Jas. R. Barber, Division Engineer of the Canadian Pacific Railway, Toronto, Ontario, has retired after many years of service in that organization. Mr. Barber was identified with several of the local railway construction jobs such as the Ontario Quebec Railway, the Guelph Junction Railway, and considerable double tracking work in the eastern Provinces.

The Constructing & Paving Co., Ltd., of Toronto, Ontario, are working on a 14,000-yard excavation at Nordheimer Avenue, Toronto.

The first annual meeting of the Association of Professional Engineers of Ontario was held in Toronto on January 8th. This is an incorporation under a bill passed by the Ontario Legislature in 1922 and seeks the registration of all practicing professional engineers in Ontario. Mr. Willis Chipman, of Chipman & Powers, consulting engineers of Toronto, was elected president. The council consists of ten members elected from the five divisions of the Association—mechanical, civil, electrical, chemical, and mining. Mr. Chipman is well known not only to his profession, but to many of the big contractors in earth moving and excavation.

International Contractors, Ltd., Toronto, are extending their activities in subdivision work near the city. The two Stockdale brothers are in charge of the direction of the Company's affairs.

Mr. E. Corner, Excavating Contractor of Toronto, Ontario, is working on an excavating contract for the Gabriel Manufacturing Company's new factory.

The John E. Russell Co., Ltd., Toronto, are planning some further improvements to their gravel plant at Durham, Ontario.

The newly formed Township of North York voted and passed a by-law on $125,000.00 for a waterworks system. The old Township of York from which the northern division seceeded has also decided to extend their waterworks system.

The voting on the joint filtration system for the three Border Cities, Sandwich, Windsor and Walkerville, was passed at the January election and it looks now as if this comprehensive scheme would go through.

Mr. T. L. Ferguson, Chief of the Drainage Division of Ontario, has announced that a special course on drainage work will be held in Chatham early in February. The course will cover two weeks commencing February 5th. Special invitation is extended to operators of dredging and ditching machinery. The meetings will be held in Harrison Hall.

The Department of the Interior at Ottawa through its Director of Reclamation Service, Mr. E. F. Drake has been issuing some specially interesting information on both irrigation and drainage work. In spite of the amount of work that has already been done in this field there is still an almost unlimited area of Canadian Government Lands capable of being brought into excellent cultivation by these methods; it is estimated that some 75,000,000 acres require reclamation in this way. It has been shown that the irrigated lands of the West are the most dependable and richest in crop in any part of the Provinces; and the limit to that work seems to be the willingness of the people to form irrigation districts and secure the necessary guarantee from their Government for the bond issues.

Mr. Harry Boss, Contractor of London, Ontario, is extending his activities in excavating and gravel pit work.

W. H. Thompson, 29 Marlborough Avenue, Toronto, was awarded contract for the excavation in connection with the new Trinity College buildings at Toronto, Ontario.

The F. W. Scriven Construction Co., Ltd., Toronto, Ontario, has recently been incorporated to carry on business as general contractors. They recently undertook 135,000 yards of excavation for the Home Smith Co., Toronto.

The Bucyrus Convention at Milwaukee was the "red letter" event for the Canadian contingent of Mussens Limited since we wrote our last notes. For downright getting together to discuss business problems as well as for pleasant friendships the convention could not be beaten.

TRADE NOTES

Important Construction Projects Abroad

New Drydock at Dumferline, Scotland, Proposed. New Street Railway for Finland. Finnish Hydroelectric Plant Well Under Way. Big New Hotel for Mexico City. Power Scheme in Sinaloa.

Among the important new constructions abroad, projected or under way, reported during the week to the Department of Commerce are the following:

Scotland—Consul J. D. Van Sant, Dumferline, reports that construction of a drydock to cost $400,000 has come up for immediate consideration at Dumferline. Burntisland and Kirkcaldy and other town councils are in consultation over the matter.

Finland—Negotiations have recently been carried on between a committee appointed by the city of Tammerfors, Finland, and a certain firm, according to a report from Consul L. A. Davis, Helsingfors, for the construction of street railway lines in that city. The city is to buy a minority of the shares and the railway is to revert to it within a period of 40 years. It is thought that the proposition will mature in the near future, as the city has previously granted about 1,000,000 Finnish marks for the purpose. Consul Davis reports also that Finland's largest hydroelectric power station harnessing the energy of the Vucksen Rapids is well under way. The total head is to be utilized in four steps, the second being now under construction. When the plan is fully realized there will be a yield of 392,000 turbine horsepower, with a possibility of increasing this to 680,000 horsepower through controlling the water level of the Saima lakes.

Mexico—According to El Universal arrangements have been completed for the erection by a Mexican company of a large new building on the site of the present Cuartel de Bomberos and the Pabellon Espanol. The building will be used as a hotel and will contain 700 rooms. The company undertaking the construction has been organized with a capital of four million pesos. Hydroelectric power from the mountains near the Sinaloa-Durango state line will be used for mining, irrigation, and other purposes under a scheme now being projected in the State of Sinaloa, according to a report from Consul W. E. Chapman. All the field recognizance and location work has been concluded and decision has been reached to begin the work of installing plant and appurtenances. The management is now carrying out arrangements to secure the authority of the Mexican Government to establish means of providing public service. Two hydroelectric units are to be installed, one of high-head generating 25,000 horsepower, and an auxiliary unit of 1,500 horsepower operating under a low head. Additional features of the project include a concrete dam 80 feet high, 275 miles of transmission line and extensive flood control and irrigation works.

T. E. Doremus, who for the past three and a half years has represented E. I. du Pont de Nemours & Company, as General Eastern Manager for the Orient, with headquarters at Shanghai, China, has returned to the United States. Mr. Doremus is now located at Seattle, Washington, where he is Manager for the Explosives Department of the du Pont Company.

Notice

The National Highway Traffic Association's Annual Convention will be held at Cleveland, Ohio, February 19-20, 1923.

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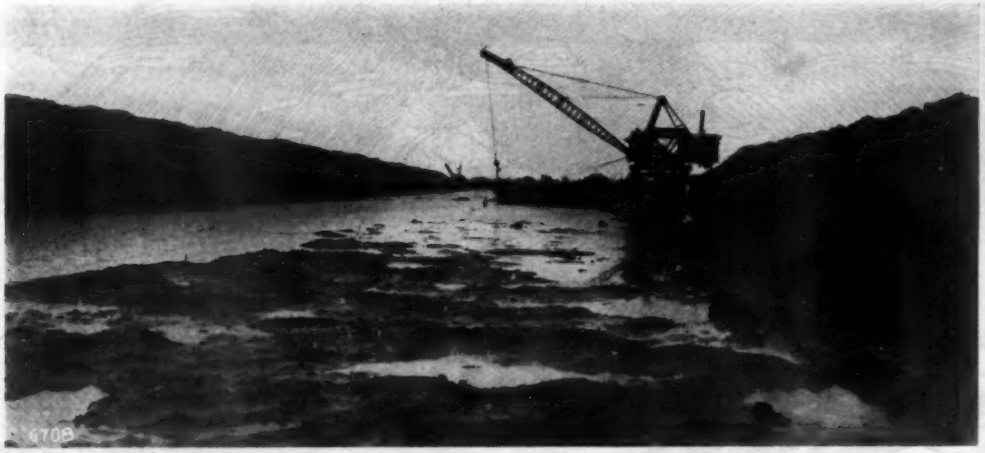

Bucyrus Class-175 dragline at work on the Main Canal. This machine is equipped with a 75-foot boom.

Excavating the pit for the barrage or diversion dam. The shovel is a 70-ton Bucyrus, originally owned by the Luang Suan Tin Mine in the Malay Peninsula. It is 18 years old.

Digging the Main Canal, Prasak Project, Siam